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09/498,012	02/04/2000	Craig M. Jarchow	APA-001	8206

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E Eugene Thigpen
P O Box 42427
Houston, TX 77242

EXAMINER	
DAY, HERNG DER	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/498,012	JARCHOW, CRAIG M.	
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicant's Reply ("Reply") and RCE to Office Action dated April 20, 2004, mailed October 15, 2004, and received by PTO October 18, 2004.

1-1. Claims 1, 3-4, 6-8, 10-12, 15-16, 18-19, and 21-22 have been amended. Claims 1-25 are pending.

1-2. Claims 1-25 have been examined and rejected.

Oath/Declaration

2. Dr. David Monk's DECLARATION UNDER 37 C.F.R. 1.132, ("DECLARATION") received on October 18, 2004, has been reviewed. However, the argument is not persuasive for the following reasons:

(1) The Serial No. 09/952,854 at page 1 of the DECLARATION is incorrect because only the present Application 09/498,012 has been mentioned in the argument of the DECLARATION.

(2) As declared in paragraph 5 of the DECLARATION, "The disclosure in US Patent 6,131471 (the 'Partyka et al.' patent) neither discloses nor suggests the invention disclosed and claimed in US Patent Application 09/498,012. With reference to claim 1 of US Patent Application 09/498,012, as presently amended, there are no teachings or suggestions in Partyka et al. of utilizing frequencies having the greatest amplitude within the frequency spectrum of seismic data to generate a seismic display, and utilizing this display to determine the presence of thin beds". Dr. David Monk has merely alleged that the prior art has not suggested the claimed invention without arguing the Examiner's response in section 14-1 of Office Action dated April

20, 2004. In section 14-1, the Examiner states, "Partyka's patent is directed generally toward a method of processing seismic data to provide improved quantification and visualization of subtle seismic thin bed tuning effects and other sorts of lateral rock discontinuities (Abstract, first paragraph). 'After processing the seismic traces within the zone of interest, each tuning cube may be individually examined for evidence of thin bed effects' (column 24, lines 24-26). In other words, all the tuning cubes discussed in Partyka's patent including FIG. 14, which is a peak frequency tuning cube, are individually examined for evidence of thin bed effects as suggested by Partyka et al.".

Accordingly, Dr. David Monk's argument presented in the DECLARATION is not persuasive.

Specification

3. The objections to the specification have been withdrawn.

Claim Objections

4. Claim 12 is objected to because of the following informalities. Appropriate correction is required.

4-1. Regarding claim 12, "generating a substantially vertical cross-section of said seismic data to <u>to</u> represent either the presence or absence of thin beds in said vertical cross-section.<u>.</u>", as described in lines 1-3 of the claim. (Emphasis added.)

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 10-14 and 21-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6-1. Claim 10 recites the limitation "the Kurtosis of each said frequency spectrum" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

6-2. Claim 13 recites the limitation "the maximum entropy transform" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim.

6-3. Claim 21 recites the limitations "the Kurtosis of each said frequency spectrum" in line 10 of the claim and "said seismic display" in lines 16-17 of the claim. There are insufficient antecedent basis for these limitations in the claim.

6-4. Claims not specifically rejected above are rejected as being dependent on a rejected claim.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 1-16, 18-19, 21-22 and 24 are rejected under 35 U.S.C. 101 because the inventions as disclosed in claims are directed to non-statutory subject matter. In other words, it

is not tangibly embodied because it could be practiced with pencil and paper and because it appears to be directed to abstract ideas.

8-1. Claims 1-16, 18-19, and 21-22 claim a method that is not in the technology arts, which is evidenced by comparing dependent claims 17, 20, and 23 claiming "wherein said method is implemented on a digital computer".

8-2. Claim 24 recites the limitation "a device adapted for use by a digital computer wherein a plurality of computer instructions readable by said digital computer and defining the process of claim 1 and instructing said computer to perform said process are encoded". However, "computer instructions readable by digital computer are encoded could be done by scanning instruction code written on the paper", therefore, it is not in the technology arts.

8-3. The Examiner acknowledges that even though the claims are presently considered non-statutory they are additionally rejected below over the prior art. The Examiner assumes the Applicant will amend the claims to overcome the 101 rejections and thus make the claims statutory.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686

F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9-1. Claims 1-25 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 09/952,854. Although the conflicting claims are not identical, they are not patentably distinct from each other. In other words, even they all directed to a method of processing a group of spatially related seismic data traces to determine the presence of thin beds, the present Application utilizes frequencies having the greatest amplitude to determine the presence of thin beds and the copending Application analyzes the averaged frequency spectra to determine the location of thin beds. However, if the presence of thin beds can be determined utilizing the seismic display which has been generated by utilizing the frequencies having the greatest amplitude within successively selected windows then the location of thin beds can also be determined by analyzing the averaged frequency spectra because each greatest amplitude associate with the presence of thin beds will contribute much more to the averaged frequency spectra. Therefore, it would have been obvious to one of ordinary skill in the art to analyze the

averaged frequency spectra to determine the location of thin beds because each greatest amplitude associate with the presence of thin beds will contribute much more to the averaged frequency spectra and make it distinguishable.

9-2. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-7, 13-20, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's assertion and Partyka et al., U.S. Patent 6,131,071 issued October 10, 2000, and filed January 19, 1999, in view of Cox et al., "Maximum Entropy Analysis of Dispersed Seismic Signals", Geophysics, Vol. 51, No. 12, December 1986, pages 2225-2234.

11-1. Regarding claims 1 and 13-14, Partyka et al. disclose a method of processing a group of spatially related seismic data traces (abstract; and summary, column 7, line 9, through column 11, line 7), comprising:

defining seismic data windows extending over selected portions of said group of spatially related seismic data traces (transform window, column 17, lines 36-57);

generating a frequency spectrum of the seismic data within successively selected windows of said seismic data traces by applying a transform to said successively selected windows (discrete Fourier transform, column 7, lines 10-13);

determining the frequency having the greatest amplitude within the frequency spectrum of the seismic data within said successively selected windows (location of maximum frequency, column 31, lines 54-57; and Fig. 14);

utilizing said determined frequencies having the greatest amplitude to generate a seismic display in which horizontal dimension represents distance and vertical dimension represents time (to image and map the extent of thin beds, column 7, lines 10-13; a commercially available visualization software package, Applicant's assertion, lines 1-2, page 15; tuning cube, column 20, lines 13-17); and

utilizing said seismic display to determine the presence of thin beds (thin bed effects may be identified, column 24, lines 24-32).

Partyka et al. fail to expressly disclose the transform having poles on the unit z-circle, where z is the z-transform. Nevertheless, Partyka et al. suggest that a wide variety of discrete data transformations other than the Fourier (column 38, lines 13-24) can be used to identify thin bed effects.

Cox et al. disclose "maximum entropy power spectral analysis eliminates the resolution constraints imposed by convolution of window's Fourier transform with the spectrum of the trace segment" (Cox, page 2225, column 2, paragraph 3). In other words, using maximum entropy method will enhance the resolution of a moving-window analyzer. Specifically, Cox et

al. disclose the missing element that the transform having poles on the unit z-circle, where z is the z-transform.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Partyka et al. to incorporate the teachings of Cox et al. to obtain the invention as specified in claims 1 and 13-14 because by using maximum entropy method to replace Fourier transform, the resolution of a moving-window analyzer will be enhanced (Cox, abstract).

11-2. Regarding claim 2, Partyka et al. further disclose the seismic display represents the frequency having the greatest amplitude within each said frequency spectrum (location of maximum frequency, column 31, lines 54-57; and Fig. 14).

11-3. Regarding claim 3, Partyka et al. further disclose said spatially related seismic data traces comprise a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

11-4. Regarding claim 4, Partyka et al. further disclose comprising generating a substantially horizontal cross-section of said seismic data to represent either the presence or absence of thin beds in said horizontal cross-section (thin bed effects may be identified, column 24, lines 24-32).

11-5. Regarding claim 5, Partyka et al. further disclose comprising determining the amplitude of the frequency having the greatest amplitude within each said frequency spectrum (amplitude at the maximum frequency, column 31, line 17, through column 32, line 56); and

wherein the seismic display represents said amplitude (tuning cube, column 20, lines 13-17).

11-6. Regarding claim 6, Partyka et al. further disclose said spatially related seismic data traces comprise a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

11-7. Regarding claim 7, Partyka et al. further disclose comprising generating a substantially horizontal cross-section of said seismic data to represent either the presence or absence of thin beds in said horizontal cross-section (thin bed effects may be identified, column 24, lines 24-32).

11-8. Regarding claim 15, Partyka et al. disclose a method of processing a group of spatially related seismic data traces (abstract; and summary, column 7, line 9, through column 11, line 7), comprising:

defining seismic data windows extending over selected portions of said group of spatially related seismic data traces (transform window, column 17, lines 36-57);

generating a frequency spectrum of the seismic data within successively selected windows of said seismic data traces by applying a transform to said successively selected windows (discrete Fourier transform, column 7, lines 10-13);

determining the frequency value of the frequency component having the greatest amplitude within each said frequency spectrum (location of maximum frequency, column 31, lines 54-57; and Fig. 14); and

utilizing said determined frequency values to generate a seismic display in which the horizontal dimension represents distance and vertical dimension represents time (to image and map the extent of thin beds, column 7, lines 10-13; a commercially available visualization software package, Applicant's assertion, lines 1-2, page 15; tuning cube, column 20, lines 13-17); and

utilizing said seismic display to determine the presence of thin beds (thin bed effects may be identified, column 24, lines 24-32).

Partyka et al. fail to expressly disclose applying a maximum entropy transform to said successively selected windows. Nevertheless, Partyka et al. suggest that a wide variety of discrete data transformations other than the Fourier (column 38, lines 13-24) can be used to identify thin bed effects.

Cox et al. disclose "maximum entropy power spectral analysis eliminates the resolution constraints imposed by convolution of window's Fourier transform with the spectrum of the trace segment" (Cox, page 2225, column 2, paragraph 3). In other words, using maximum entropy method will enhance the resolution of a moving-window analyzer. Specifically, Cox et al. disclose the missing element of applying a maximum entropy transform to said successively selected windows.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Partyka et al. to incorporate the teachings of Cox et al. to obtain the invention as specified in claim 15 because by using maximum entropy method to replace Fourier transform, the resolution of a moving-window analyzer will be enhanced (Cox, abstract).

11-9. Regarding claim 16, Partyka et al. further disclose said spatially related seismic data traces comprise a substantially horizontal cross-section of a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

11-10. Regarding claim 17, Partyka et al. further disclose said method is implemented on a digital computer and comprises all limitation steps as shown in Fig. 8 and Fig. 14 except that Partyka et al. fail to expressly disclose calculating coefficients for the maximum entropy transform. Nevertheless, Partyka et al. suggest that a wide variety of discrete data transformations other than the Fourier (column 38, lines 13-24) can be used to identify thin bed effects.

Cox et al. disclose "maximum entropy power spectral analysis eliminates the resolution constraints imposed by convolution of window's Fourier transform with the spectrum of the trace segment" (Cox, page 2225, column 2, paragraph 3). In other words, using maximum entropy method will enhance the resolution of a moving-window analyzer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Partyka et al. to incorporate the teachings of Cox et al. to obtain the invention as specified in claim 17 because by using maximum entropy method to replace Fourier transform, the resolution of a moving-window analyzer will be enhanced (Cox, abstract).

11-11. Regarding claim 18, Partyka et al. disclose a method of processing a group of spatially related seismic data traces (abstract; and summary, column 7, line 9, through column 11, line 7), comprising:

defining seismic data windows extending over selected portions of said group of spatially related seismic data traces (transform window, column 17, lines 36-57);

generating a frequency spectrum of the seismic data within successively selected windows of said seismic data traces by applying a transform to said successively selected windows (discrete Fourier transform, column 7, lines 10-13);

determining the greatest amplitude of the frequency components within each said frequency spectrum (the amplitude at the maximum frequency, column 31, lines 57-59); and

utilizing said amplitudes to generate a seismic display in which the horizontal dimension represents distance and the vertical dimension represents time (to image and map the extent of thin beds, column 7, lines 10-13; a commercially available visualization software package, Applicant's assertion, lines 1-2, page 15; tuning cube, column 20, lines 13-17); and

utilizing said seismic display to determine the presence of thin beds (thin bed effects may be identified, column 24, lines 24-32).

Partyka et al. fail to expressly disclose applying a maximum entropy transform to said successively selected windows. Nevertheless, Partyka et al. suggest that a wide variety of discrete data transformations other than the Fourier (column 38, lines 13-24) can be used to identify thin bed effects.

Cox et al. disclose "maximum entropy power spectral analysis eliminates the resolution constraints imposed by convolution of window's Fourier transform with the spectrum of the trace segment" (Cox, page 2225, column 2, paragraph 3). In other words, using maximum entropy method will enhance the resolution of a moving-window analyzer. Specifically, Cox et al. disclose the missing element of applying a maximum entropy transform to said successively selected windows.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Partyka et al. to incorporate the teachings of Cox et al. to obtain the invention as specified in claim 18 because by using maximum entropy method to replace Fourier transform, the resolution of a moving-window analyzer will be enhanced (Cox, abstract).

11-12. Regarding claim 19, Partyka et al. further disclose said spatially related seismic data traces comprise a substantially horizontal cross-section of a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

11-13. Regarding claim 20, Partyka et al. further disclose said method is implemented on a digital computer and comprises all limitation steps as shown in Fig. 8 and in column 31, lines 57-59 except that Partyka et al. fail to expressly disclose calculating coefficients for the maximum entropy transform. Nevertheless, Partyka et al. suggest that a wide variety of discrete data transformations other than the Fourier (column 38, lines 13-24) can be used to identify thin bed effects.

Cox et al. disclose "maximum entropy power spectral analysis eliminates the resolution constraints imposed by convolution of window's Fourier transform with the spectrum of the trace segment" (Cox, page 2225, column 2, paragraph 3). In other words, using maximum entropy method will enhance the resolution of a moving-window analyzer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Partyka et al. to incorporate the teachings of Cox et al. to obtain the invention as specified in claim 20 because by using maximum entropy method to

replace Fourier transform, the resolution of a moving-window analyzer will be enhanced (Cox, abstract).

11-14. Regarding claim 24, this device claim performs the process of claim 1 and is unpatentable using the same analysis of claim 1.

11-15. Regarding claim 25, Partyka et al. further disclose said device is selected from the group consisting of a magnetic tape, a magnetic disk, and an optical disk (by using a magnetic disk, by type, by optical disk, column 16, lines 15-20).

12. Claims 8-12 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's assertion and the combined teachings of Partyka et al., U.S. Patent 6,131,071 issued October 10, 2000, and filed January 19, 1999, and Cox et al., "Maximum Entropy Analysis of Dispersed Seismic Signals", Geophysics, Vol. 51, No. 12, December 1986, pages 2225-2234, and further in view of Kern et al., U.S. Patent 4,665,390 issued May 12, 1987.

12-1. Regarding claims 8-10, Partyka et al. further disclose utilizing the frequency having the greatest amplitude to calculate bed thickness (the tuning thickness depends only on the dominant wavelength of the wavelet, column 6, lines 24-28; standard formula, known to those of ordinary skill in the art, Applicant's assertion, lines 20-23, page 13). The seismic display represents calculated bed thickness (to image and map the extent of thin beds, column 7, lines 10-13; a commercially available visualization software package, Applicant's assertion, lines 1-2, page 15; tuning cube, column 20, lines 13-17). However, Partyka et al. fail to expressly disclose determining whether the peakedness or kurtosis of said frequency spectrum exceeds a selected value.

Kern et al. disclose "Statistical discriminators for fire sensing may be combined with other types of sensors operating in the frequency domain for developing improved sensitivity with better security against false alarms" and "determines ... the Kurtosis of sampled data in statistical analysis to discriminate between fires and non-fires" (abstract). Specifically, "kurtosis is a measure of how the collection of data is concentrated about its mean" (Kern, column 3, lines 50-53) and "For example, a waveform with a few large, narrow peaks, but most of its information concentrated near zero, could have a large kurtosis due to the fourth power effect of the large peaks" (Kern, column 6, lines 45-48). In other words, Kern et al. disclose techniques to measure the randomness of sampled data and use the Kurtosis of sampled data in statistical analysis for developing improved sensitivity with better security against false alarms.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teachings of Partyka et al. and Cox et al. to incorporate the teachings of Kern et al. to obtain the invention as specified in claims 8-10 because to calculate bed thickness only when the kurtosis of said frequency spectrum exceeds a selected value will develop improved sensitivity in statistical analysis to discriminate the existence of thin beds.

12-2. Regarding claim 11, Partyka et al. further disclose said spatially related seismic data traces comprise a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

12-3. Regarding claim 12, Partyka et al. further disclose generating a substantially vertical cross-section of said seismic data to represent either the presence or absence of thin beds in said vertical cross-section (to image and map the extent of thin beds, column 7, lines 10-13; a

commercially available visualization software package, Applicant's assertion, lines 1-2, page 15; tuning cube, column 20, lines 13-17).

12-4. Regarding claim 21, Applicant's assertion and the combined teachings of Partyka et al. and Cox et al. meet all the claimed limitations except (1) calculating kurtosis; (2) determining if the kurtosis of each said frequency spectrum exceeds a selected value of kurtosis; and (3) calculating bed thickness if the kurtosis value exceeds a selected value.

Kern et al. disclose "Statistical discriminators for fire sensing may be combined with other types of sensors operating in the frequency domain for developing improved sensitivity with better security against false alarms" and "determines ... the Kurtosis of sampled data in statistical analysis to discriminate between fires and non-fires" (abstract). Specifically, "kurtosis is a measure of how the collection of data is concentrated about its mean" (Kern, column 3, lines 50-53) and "For example, a waveform with a few large, narrow peaks, but most of its information concentrated near zero, could have a large kurtosis due to the fourth power effect of the large peaks" (Kern, column 6, lines 45-48). In other words, Kern et al. disclose techniques to measure the randomness of sampled data and use the Kurtosis of sampled data in statistical analysis for developing improved sensitivity with better security against false alarms.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teachings of Partyka et al. and Cox et al. to incorporate the teachings of Kern et al. to obtain the invention as specified in claim 21 because to calculate bed thickness only when the kurtosis of said frequency spectrum exceeds a selected value will develop improved sensitivity in statistical analysis to discriminate the existence of thin beds.

12-5. Regarding claim 22, Partyka et al. further disclose said spatially related seismic data traces comprise a substantially vertical cross-section of a three-dimensional volume of seismic data (A 3-D survey produces a data 'cube' or volume, column 1, line 43 through column 2, line 24).

12-6. Regarding claim 23, the combined teachings of Partyka et al. and Cox et al. meet all the claimed limitations as shown in Fig. 8 and Fig. 14, except (1) calculating kurtosis; (2) determining whether said calculated kurtosis exceeds a preselected kurtosis value.

Kern et al. disclose "Statistical discriminators for fire sensing may be combined with other types of sensors operating in the frequency domain for developing improved sensitivity with better security against false alarms" and "determines … the Kurtosis of sampled data in statistical analysis to discriminate between fires and non-fires" (abstract). Specifically, "kurtosis is a measure of how the collection of data is concentrated about its mean" (Kern, column 3, lines 50-53) and "For example, a waveform with a few large, narrow peaks, but most of its information concentrated near zero, could have a large kurtosis due to the fourth power effect of the large peaks" (Kern, column 6, lines 45-48). In other words, Kern et al. disclose techniques to measure the randomness of sampled data and use the Kurtosis of sampled data in statistical analysis for developing improved sensitivity with better security against false alarms.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teachings of Partyka et al. and Cox et al. to incorporate the teachings of Kern et al. to obtain the invention as specified in claim 23 because to calculate bed thickness only when the kurtosis of said frequency spectrum exceeds a selected value will develop improved sensitivity in statistical analysis to discriminate the existence of thin beds.

Applicants' Arguments

13. Applicant argues the following:

(1) "Each of the claims rejected under Section 112 have been amended, and it is believed the basis for the rejections has now been overcome" (page 9, paragraph 2, Reply).

(2) "Dr. Monk states in the Declaration submitted herewith that he can find no teachings or suggestion of using the frequency having the greatest amplitude within the frequency spectrum in a seismic display and using that display for determining the location of thin beds" (page 12, first paragraph, Reply).

(3) "There are no teachings or suggestion whatsoever in Partyka et al., whether taken alone or in combination with any of the other references, of 'determining the frequency having the greatest amplitude within the frequency spectrum of the seismic data within said successively selected windows; utilizing said determined frequencies having the greatest amplitude to generate a seismic display in which horizontal dimension represents distance and vertical dimension represents time, and utilizing said seismic display to determine the presence of thin beds" (page 12, paragraph 2, Reply).

(4) Claims 2, 5, and 8 claim different embodiments (page 12, last paragraph, Reply).

(5) "Independent claims 15 and 18 were rejected on substantially the same grounds as claim 1, and those rejections are traversed for the same reasons advanced with respect to claim 1" (page 13, paragraph 2, Reply).

Response to Arguments

14. Applicant's arguments have been fully considered.

14-1. Response to Applicant's argument (1). The rejections of claims 1-20, 22, and 24-25 under 35 U.S.C. 112, in Office Action dated April 20, 2004, have been withdrawn.

14-2. Applicant's arguments (2) - (5) are not persuasive. Dr. David Monk's DECLARATION has been reviewed. However, the argument is not persuasive because Dr. Monk has merely alleged that the prior art has not suggested the claimed invention without arguing the Examiner's response in section 14-1 of Office Action dated April 20, 2004. In section 14-1, the Examiner states, "Partyka's patent is directed generally toward a method of processing seismic data to provide improved quantification and visualization of subtle seismic thin bed tuning effects and other sorts of lateral rock discontinuities (Abstract, first paragraph). 'After processing the seismic traces within the zone of interest, each tuning cube may be individually examined for evidence of thin bed effects' (column 24, lines 24-26). In other words, all the tuning cubes discussed in Partyka's patent including FIG. 14, which is a peak frequency tuning cube, are individually examined for evidence of thin bed effects as suggested by Partyka et al.". Accordingly, Dr. David Monk's argument presented in the DECLARATION is not persuasive and the prior art rejections are maintained.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Reference to Alam, U.S. Patent 6,278,949 B1 issued August 21, 2001, is cited as disclosing a method for multi-attribute identification of structure and stratigraphy in a volume of seismic data.

16. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Jean Homere can be reached on (571) 272-3780. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day H.D
November 22, 2004

JEAN R. HOMERE
PRIMARY EXAMINER